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BY:

Genee Carter

Date:

November 22, 2004

MAIL STOP APPEAL BRIEF - PATENTS

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In Re Patent Application of:

Michael J. Pollack

Conf. No.: 3856

Group Art Unit: 2613

Appln. No.: 10/058,658

Examiner: Richard J. Lee

Filing Date: January 28, 2002

Attorney Docket No.: 285-670U1

Title:

MONITORING SYSTEM FOR HOSTILE ENVIRONMENT

APPEAL BRIEF TRANSMITTAL LETTER

Enclosed are the following:

<input checked="" type="checkbox"/>	Appellant's Brief Under 37 C.F.R. § 41.37;
<input checked="" type="checkbox"/>	A Petition for Extension of time (2 months) with requisite fee (\$430.00);
<input checked="" type="checkbox"/>	A check in the amount of \$340.00 to cover the filing fee.
<input checked="" type="checkbox"/>	The Commissioner is hereby authorized to charge Deposit Account No. 50-1017 (Billing No. 200285.0689) as noted below. An additional copy is enclosed.
<input type="checkbox"/>	Appellant's Brief fee in the amount of \$330.00.
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Respectfully submitted,

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**ON APPEAL FROM THE PRIMARY EXAMINER TO THE BOARD OF PATENT
APPEALS AND INTERFERENCES**

APPELLANT'S BRIEF UNDER 37 C.F.R. § 41.37

11/26/2004 YPOLITE1 00000019 10058658

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I. REAL PARTIES IN INTEREST

This application is assigned to Greene, Tweed of Delaware, Inc. and Three E Laboratories, Inc., by an Assignment recorded on January 28, 2002, at Reel 012547, Frame 0578. Accordingly, Greene, Tweed of Delaware, Inc. and Three E Laboratories, Inc. are the real parties in interest.

II. RELATED APPEALS AND INTERFERENCES

Appellant, his assignees, and their legal representatives are unaware of the existence of any related appeals and interferences that will directly affect, be directly affected by, or have a bearing on the Board's decision in the pending appeal.

III. STATUS OF CLAIMS

Claims 1-31 are pending in this application. In an Office Action, mailed April 21, 2004 (Paper No. 11), claims 1-31 were rejected under 35 U.S.C. § 103(a) on the grounds discussed below.

Claims 1-31 are appealed. The text of claims 1-31, as pending, is attached hereto as Appendix A.

IV. STATUS OF AMENDMENTS

All amendments have been entered.

V. SUMMARY OF CLAIMED SUBJECT MATTER

The claims of the invention are directed to a monitoring system, such as the system shown as 10 in Fig. 1 or 210 in Fig. 5. The system is for transmitting images from and/or monitoring or measuring parameters in a hostile environment within an interior 112 of a sealed chamber, such as a semiconductor processing chamber 100. (Specification ("Spec.") page 5,

lines 30-32 and page 13, lines 4-7) The chamber has a wall 102 and an access port 114 extending through the wall 102. (Spec. page 4, lines 20-21 and page 7, lines 27-30).

Oftentimes, it is desirable to view or monitor the conditions within hostile environments, such as the environments present within semiconductor wafer processing chambers. Typically, however, the conditions within such chambers preclude the use of standard, unprotected sensing or monitoring equipment and techniques. (Spec. page 5, lines 10-21). The monitoring system of the present invention as claimed in claims 1-31 overcomes this problem by providing a system for monitoring one or more parameters and/or transmitting images from within such a hostile environment. (Spec. page 5, lines 25-29).

As claimed, the optical monitoring system includes a generally tubular, elongated, hermetically sealed protective housing 12 having a distal end 14 and a proximal end 16, which housing is flexible in claims 1, 9, 17, and 23 and claims dependent thereto and optionally flexible in claims 30 and 31. The protective housing 12 is made of a non-porous material, such as, but not limited to, stainless steel, for instance. (Spec. page 6, lines 1-8). In claims 1, 9, 17, 23, and dependent claims, the non-porous material is corrosion-resistant. A sealed window 22 is at the distal end 14 of the housing 12. (Spec. page 7, lines 1-2). The proximal end 16 of the housing 12 is secured to the chamber wall 102 at the access port 114 to form a hermetic seal between the proximal end 16 of the housing 12 and the chamber 100. (Spec. page 9, lines 7-20). The interior of the housing 12 is accessible through the access port 114. The interior of the housing 12 includes a transmission media, for example, one or more electrical wires or fiber optic bundles. (Spec. page 10, lines 7-10). Optical images obtained of the interior 112 of the chamber 100 through the window 22 or output signals are transmitted through the transmission media to a monitor 58 or apparatus. (Spec. page 10, lines 22-31).

In claim 9 and the claims dependent thereto, a camera is employed for recording images of the interior of the chamber through the window. (Spec. page 11, lines 1-14).

In claim 17 and the claims dependent thereto, the interior of the housing includes a flexible borescope 50. (Spec. page 10, lines 15-19).

In claim 23, 31, and the claims dependent thereto, the housing includes a sensor for sensing a parameter of the hostile environment through the window 22. (Spec. page 9, lines 29-31 and page 10, lines 5-7). Transmission media transmits an output signal of the sensor to an apparatus located outside of the chamber 100. The apparatus receives and processes the sensor

signal. As claimed in claim 23 and the dependent claims, the apparatus further displays a representation of the sensor signal. (Spec. page 10, lines 7-14).

VI. GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL

- A. Claims 1, 4, 5, 9, 10, 13, 14, 23, 27, 28, 30 and 31 are rejected under 35 U.S.C. § 103(a) based upon U.S. Patent No. 5,956,077 of Qureshi *et al.* (“Qureshi”), in view of U.S. Patent No. 6,111,599 of Nance *et al.* (“Nance”) and U.S. Patent No. 5,993,902 of Heid (“Heid”).
- B. Claims 2, 11, 18 and 25 are rejected under 35 U.S.C. § 103(a) based upon Qureshi *et al.*, Nance *et al.*, and Heid as applied to claims 1, 4, 5, 9, 10, 13, 14, 23, 27, 28, 30 and 31, and further in view of U.S. Patent No. 4,591,794 of Shattuck *et al.* (“Shattuck”).
- C. Claims 3, 12, 19 and 26 are rejected under 35 U.S.C. § 103(a) based upon Qureshi *et al.*, Nance *et al.*, and Heid as applied to claims 1, 4, 5, 9, 10, 13, 14, 23, 27, 28, 30 and 31, and further in view of U.S. Patent No. 4,540,258 of Chiodo (“Chiodo”).
- D. Claims 6, 7, 17, 20 and 21 are rejected under 35 U.S.C. § 103(a) based upon Qureshi *et al.*, Nance *et al.*, and Heid as applied to claims 1, 4, 5, 9, 10, 13, 14, 23, 27, 28, 30 and 31, and further in view of U.S. Patent No. 3,778,170 of Howell *et al.* (“Howell”).
- E. Claims 8, 15, 16, 22, 24 and 29 are rejected under 35 U.S.C. § 103(a) based upon Qureshi *et al.*, Nance *et al.*, and Heid as applied to claims 1, 4, 5, 9, 10, 13, 14, 23, 27, 28, 30 and 31, and further in view of U.S. Patent Application Publication No. 2002/0116987 A1 of Braithwaite *et al.* (“Braithwaite”).

VII. ARGUMENT

A. The Examiner has Failed to Establish *Prima Facie* Obviousness of Claims 1, 4, 5, 9, 10, 13, 14, 23, 27, 28, 30 and 31 Under 35 U.S.C. § 103(a) Over Qureshi in View of Nance and Heid

The Examiner contends that Qureshi discloses an inspection method and apparatus for tanks, and substantially the same optical monitoring system as claimed. However, the Examiner concedes that Qureshi does not disclose a hermetically sealed housing having a sealed window and a video camera and/or a sensor for recording images and/or sensing parameters of the interior of the chamber through the window. The Examiner further concedes that Qureshi does

not disclose the proximal end of the housing being rigidly secured to the chamber wall at the access port to form a hermetic seal therebetween.

According to the Examiner, Nance discloses an apparatus for observing a hostile environment and teaches use of a hermetically sealed housing having a sealed window and a video camera/sensor positioned therein for transmitting images of the interior of the chamber obtained through the window from the distal end of the housing to the proximal end of the housing. The Examiner contends that it would have been obvious to one of ordinary skill in the art to modify the housing structure of Fig. 2 of Qureshi by providing a hermetically sealed housing as in Nance in order to protect the camera within the housing from a hostile environment when inspecting the interior of a chamber.

Heid, according to the Examiner, discloses “the technical features of forming a hermetical seal between the proximal end of a housing . . . and the chamber” (Office Action, dated April 21, 2004 (Paper No. 11), page 4). The Examiner then contends that it would have been obvious to one of ordinary skill in the art to provide the hermetic seal between the proximal end of the housing and the chamber in a hypothetical “modified” Qureshi/Nance system based on Heid to provide protection from chemical leaks or dangerous gases.

For the below-stated reasons, the combination of Qureshi, Nance, and Heid, as proposed by the Examiner, does not render claims 1, 4, 5, 9, 10, 13, 14, 23, 27, 28, 30 or 31 unpatentable.

The burden of establishing a *prima facie* case of obviousness lies with the Examiner. When the alleged *prima facie* case of obviousness is based on a combination of references, the onus is on the Examiner to demonstrate all of the following:

- (i) that the combination teaches or suggests all elements of the invention as claimed;
- (ii) that there is a motivation to make the combination of references proposed by the Examiner; and
- (iii) that a person of ordinary skill in the art would have a reasonable expectation that the combination would be successful. M.P.E.P. § 2143.

If any one of these elements is absent, the Examiner’s *prima facie* case cannot stand.

1. Brief Description of Prior Art from the Examiner's Combination Rejection

a. Qureshi

Qureshi is directed to an inspection method and apparatus for tanks, such as movable railroad tank cars. The system 10 includes a vertically oriented support 20 carrying an inspection arm 21 which can be movably inserted within a tank 12 requiring inspection through a manway hole 17 on a top side of the tank 12. The inspection arm 21 includes a series of articulated segments 31-36, which are connected at movable joints 37. A camera 41, lamps 49, 50, and a laser measuring device 51 are carried in a gimbal support 39 at the distal end of the inspection arm 21. An electronic controller 66 is interconnected with the servo motors 38, camera 41, lamps 49, 50, and measuring device 51 by appropriate wires and slip rings.

The system 10 of Qureshi is clearly intended to be used to inspect the open environment of interiors of the tanks 12 of railroad tank cars 11 requiring inspection in between a filled and an unfilled condition prior to being re-filled again. Such cars were previously visually inspected by workers who had to climb into the tanks in order to personally inspect the interiors of the tanks. The Qureshi system 10 is intended to be lowered into a tank while the manway is open to inspect the interior thereof and then removed from the tank to enable the system 10 to be used to inspect another tank and so that the tank can be filled. That is, the system 10 is portable and is only temporarily coupled to the tanks, and not rigidly attached thereto. The tanks are empty to use the system with the manway open. When the system is removed, the tanks then are filled and the manway closed.

b. Nance

Nance is directed to an apparatus for observing a hostile environment. The viewing apparatus 1, 101 of a first and second embodiment, respectively, includes a housing 10, 110 and at least one camera 30, 130 disposed within the housing 10, 110. The viewing apparatus 1, 101 is intended to be inserted into a downspout of a Defense Waste Processing Facility about 1.5 to 2 inches from a molten glass stream in order to monitor the molten glass stream.

As best shown in Fig. 1, although the Nance viewing assembly 1, 101 includes a hermetically sealed chamber 23 (Fig. 2), 123 (Fig. 4), the chamber 23, 123 is formed between an inner wall 11, 111 and an outer wall 13, 113 of the housing 10, 110 itself, not the hostile environment chamber, such that the housing 10, 110 is simply a double wall vacuum bottle. However, the camera is disposed in a void area 21, 121, which is not disclosed as being

hermetically sealed (see Fig. 2). In fact, referring to Figs. 2 and 4, there appears to be no seal of any kind in either the opening 15 of the first embodiment or the inlet 181 or outlet 185 of the second embodiment. Further, although Nance states that the viewing assembly 1, 101 is insertable within the downspout so as to be placed proximate the flowing molten glass, there is no mention of the viewing assembly 1, 101 being secured within the downspout, leading one to assume that the viewing assembly 1, 101 is neither secured nor sealed within the downspout.

c. Heid

Heid is directed to an apparatus and method for extending the lifetime of an exhaust sleeve for growing single-crystal silicon by silicon nitride coating. Although Heid discloses an apparatus 10 having a hermetically sealed furnace 12, Heid merely refers to a camera 50 located on the top of the furnace 12 to supply data to a controller 38. There is no specific discussion of the structure of the camera nor of the interface between the camera 50 and the wall of the furnace 12. In fact, referring to Fig. 1, the camera 50 is merely depicted as a generic black box. As such, Heid neither teaches nor discloses a hermetic seal between a proximal end of a housing and a chamber.

2. The Combination of Qureshi, Nance, and Heid is Improper

Qureshi, Nance, and Heid are not properly combinable under 35 U.S.C. § 103(a) to render the present invention obvious. It is well settled that when making a rejection under 35 U.S.C. § 103(a), the Examiner has the burden of establishing a *prima facie* case of obviousness. The Examiner can satisfy this burden only by showing an objective teaching in the prior art, or that knowledge generally available to one of ordinary skill in the art would lead that individual to combine the teachings of the references in the manner suggested by the Examiner. *In re Fine*, 5 U.S.P.Q.2d 1596, 1598, 837 F.2d 1071 (Fed. Cir. 1988). Obviousness cannot be established by combining the teachings of the prior art to produce the claimed invention absent some teaching, suggestion or incentive supporting the combination. *In re Geiger*, 2 U.S.P.Q.2d 1276, 1278, 815 F.2d 686 (Fed. Cir. 1987). Prior art references taken in combination do not make an invention obvious unless something in the particular prior art references would suggest the advantages to be derived from combining the teachings of the references. *In re Sernaker*, 217 U.S.P.Q. 1, 6, 702 F.2d 989 (Fed. Cir. 1983). The mere fact that the prior art could be modified in the manner

proposed by the Examiner does not make the modification obvious unless the prior art suggests the desirability of the modification. *Ex parte Dussaud*, 7 U.S.P.Q.2d 1818, 1820 (PTO Bd.P.App.&Int. 1988). As the Court of Appeals for the Federal Circuit has held, it is impermissible to use hindsight reconstruction to pick and choose among isolated disclosures in the prior art to deprecate the claimed invention. *Fine*, 5 U.S.P.Q.2d at 1600. “Something in the prior art *as a whole* must suggest the desirability, and thus the obviousness of [the invention].” *Uniroyal Inc. v. Rudkin-Wiley Corp.*, 5 U.S.P.Q.2d 1434, 1438, 837 F.2d 1044 (Fed. Cir. 1988) *vacated in part on other grounds* 939 F.2d 1540, 19 U.S.P.Q.2d 1432 (Fed. Cir. 1991) (emphasis added). See M.P.E.P. § 2143.

The Examiner has failed to cite any objective teaching in Qureshi, Nance or Heid, or asserted that there is knowledge generally available to one of ordinary skill in the art, that would lead or motivate the artisan to make the combination suggested by the Examiner. In his argument, the Examiner merely states that one of ordinary skill in the art, having Qureshi, Nance, and Heid in front of him and “the general knowledge of hermetically seal[ed] housings with sealed windows associated with inspecting chambers” as well as “the general knowledge of securing camera housings at the access ports of chambers”, would have had “no difficulty” in making the suggested combination. (Office Action, Paper No. 11, pages 4-5). However, the Examiner has not pointed to a specific objective teaching in any of the references which would suggest the combination. The blanket statement that one of ordinary skill in the art would have “no difficulty” in making the suggested combination is insufficient for supporting a combination of the references, especially considering the lack of applicability of Nance and Heid with respect to the teaching of the admitted deficiencies of Qureshi with respect to disclosing each and every element of the claimed invention.

Moreover, the Examiner improperly states the standard for combining references. It is not an objective teaching to argue that if someone had the references before them and had general knowledge of hermetically sealed housings and securing camera housings at the access ports of chambers, then they would combine Nance and Heid with Qureshi and include the Nance and Heid features in the housing of the “modified” Qureshi system. Instead, the Examiner relies on the presumption that the references are already before one of ordinary skill in the art and thus places the cart before the horse. To have the references before one of ordinary

skill in the art, there must first be an objective teaching. There is no such objective teaching here.

Not only is there no objective teaching in Qureshi, Nance or Heid to make the combination suggested by the Examiner, Qureshi, Nance and Heid actually teach away from each other. The Qureshi manhole must be open during ordinary use of the inspection system. Because of this, the tank being inspected by the Qureshi system cannot be hermetically sealed. In contrast, Nance discloses a double wall vacuum bottle having a hermetically sealed chamber between the inner and outer walls of the bottle (Co. 4, lines 30-36), and Heid discloses a hermetically sealed furnace (Col. 3, lines 14-15). Additionally, the Qureshi system is portable from tank to tank in order to allow a single inspection system to be used to inspect multiple tanks, whereas the systems disclosed by Nance and Heid are intended for use with the same Defense Waste Processing Facility or furnace, respectively, and are not portable. Therefore, both Nance and Heid direct one of ordinary skill in the art away from the portable, non-hermetically sealed inspection system of Qureshi.

Accordingly, for the above reasons, the Qureshi, Nance, and Heid references are not properly combinable under 35 U.S.C. § 103(a) to render the present invention obvious, and thus a *prima facie* case of obviousness has not been established with respect to claims 1, 4, 5, 9, 10, 13, 14, 23, 27, 28, 30, and 31.

3. Even if the Combination Were Proper, Which it is Not, the Combination Fails to Teach or Suggest All Elements of the Claims

Even if the proposed Qureshi, Nance, and Heid combination were proper, the combination does not teach or suggest each element of the invention, as claimed. The combination is lacking at least two elements recited in independent claims 1, 9, 23, 30 and 31: (i) a hermetically sealed housing having, within an interior thereof, a transmission media for transmitting an image or an output signal from the distal end of the housing to the proximal end of the housing, and (ii) securing the proximal end of the housing to the chamber wall at an access port to form a hermetic seal between the proximal end of the housing and the chamber.

With respect to element (i), *supra*, the Examiner concedes the Qureshi does not disclose a hermetically sealed housing including a transmission media for transmitting images or signals from the distal end of the housing to the proximal end of the housing, and relies on Nance to allegedly remedy the deficiency. Nance does teach a “hermetically sealed chamber”, but such

chamber is formed between inner and outer walls of the housing to essentially form a double-wall vacuum bottle. The camera of Nance, however, is not in the sealed chamber of Nance but is disposed within the void area within the housing, which is actually open at its end. In fact, there is no mention in Nance of the void area within which the camera is located being hermetically sealed. At best, the combination of Qureshi and Nance would yield a modified portable device in which a double-wall vacuum bottle with an open end is disposed around the camera. The manway of Qureshi would still have to remain open to allow the portable device inside the tank and then remove it therefrom. Therefore, the use of the Nance double-wall vacuum bottle does not remedy the deficiency of Qureshi with respect to element (i) because it would not result in a hermetically sealed housing having a transmission media disposed within an interior thereof.

With respect to element (ii), *supra*, the Examiner concedes that Qureshi does not particularly disclose the proximal end of the housing being rigidly secured to the chamber wall at the access port to form a hermetic seal between the proximal end of the housing and the chamber. Instead, the Examiner relies on Heid to allegedly provide this feature. However, Heid merely discloses a sealed furnace with a camera “located on the top of the furnace” to supply data to a controller. (Col. 3, lines 53-54). In this instance, the Examiner equates the housing of the claimed invention with the camera of Heid. Heid contains no discussion of whether the camera is even secured to the top of the furnace, let alone whether a hermetic seal is formed between the proximal end of the camera and the furnace. The figures of Heid do not provide any additional assistance in determining whether the camera is secured to the furnace and whether the camera is hermetically sealed, merely portraying the camera as a generic box located at the top of the furnace. No detail can be gleaned from the figures or the text as to the details of the interface between the camera and the top of the furnace. Moreover, Heid does not disclose a camera within a housing that is attached to a chamber wall with a hermetic seal between the housing and the chamber. Thus, because Heid does not disclose a housing secured to a chamber wall to form a hermetic seal between the proximal end of the housing and the chamber, the use of Heid also does not remedy the deficiencies of Qureshi with respect to element (ii).

Therefore, for at least these reasons, the combination fails to teach or suggest all elements of independent claims 1, 9, 23, 30, and 31 and their dependent claims.

4. The Combination Fails to Provide a Reasonable Expectation of Success

Even if the combination proposed by the Examiner was proper, which it is not, a person of ordinary skill in the art would not have been motivated to make the combination because the combination fails to provide a reasonable expectation of success.

“If [the] proposed modification would render the prior art invention being modified unsatisfactory for its intended purpose, then there is no suggestion or motivation to make the proposed modification.” MPEP § 2143.01, Rev. 2, May, 2004, page 2100-131 to page 2100-132.

The purpose of Qureshi is to eliminate the need for workers to physically climb into tanks of railroad tank cars in order to visually inspect the interiors thereof by providing a system for movably and remotely visually inspecting the interiors of the railroad tank cars. (Col. 1, lines 28-47). The Qureshi system is portable and is lowered into an open manway hole on a railroad tank car to inspect the interior of the tank and then removed therefrom to allow the system to be inserted into another railroad tank car to inspect the interior of the tank of that car so that the first tank car can then be filled and used after inspection. In this way, the Qureshi system allows for the inspection of the interiors of multiple tank cars without putting workers at risk of becoming impaired or overcome by vapors or fumes within the tank.

Securing the system to the tank wall at one manway (or other access port) on one railroad tank car as suggested by the Examiner in a “modified” Qureshi/Nance device and forming a hermetic seal between the proximal end of the system and the tank would prevent the system of Qureshi from operating in its intended manner to inspect multiple tank cars. Accordingly, one of ordinary skill in the art would not believe that the portable system would be successful if the device were hermetically sealed to the car and, instead, would render it unsatisfactory for its intended purpose.

“If the proposed modification or combination of the prior art would change the principle of operation of the prior art invention being modified, then the teachings of the references are not sufficient to render the claims *prima facie* obvious.” MPEP § 2143.01, Rev. 2, May, 2004, page 2100-132. Further, in order to be able to combine Qureshi, Nance, and Heid, the combination must not require substantial reconstruction and redesign of the elements shown in Qureshi or

require a substantial change of the basic principles under which the Qureshi system was designed to operate. *Id.* at 813.

The combination proposed by the Examiner would change the principle of operation of Qureshi because the modified Qureshi device would be required to be secured to an access port of the tank to form a hermetic seal between a proximal end of the housing and the tank. As discussed above, doing so would prevent the use of the system to inspect multiple railroad tank cars by requiring the system to be secured to a single railroad tank car.

If one were to modify the Qureshi system as proposed by the Examiner, the Qureshi system would require reconstruction and redesign of the elements thereof in order to make the system operational and/or transportable with the railroad tank car, thereby changing the basic principle under which Qureshi is designed to operate, and it would no longer be capable of use in successive cars. Accordingly, one of ordinary skill in the art would not modify Qureshi as the Examiner has proposed, because doing so would change the principle of operation of the Qureshi system and not provide a reasonable expectation of success.

B. The Examiner has Failed to Establish *Prima Facie* Obviousness of Claims 2, 11, 18 and 25 Under 35 U.S.C. § 103(a) Over Qureshi in View of Nance and Heid and Further in View of Shattuck

The Examiner has rejected claims 2, 11, 18, and 25 under 35 U.S.C. § 103(a) as being unpatentable over Qureshi, Nance, and Heid as applied above, and further in view of Shattuck.

The Examiner contends that the combination of Qureshi, Nance, and Heid discloses substantially the same system as the claimed invention. However, the Examiner concedes that the combination does not disclose a housing comprising a flexible sheath formed of a stainless steel bellows, as claimed in claims 2, 11, 18, and 25. The Examiner asserts that the particular use of stainless steel bellows for housing structures associated with borescopes and monitoring of chambers is old and well-recognized in the art, citing Shattuck as exemplary of this assertion. The Examiner contends that it would have been obvious to one of ordinary skill in the art to provide the stainless steel bellows structure of Shattuck for the housing of Qureshi.

For the below-stated reasons, the combination of Qureshi, Nance, Heid and Shattuck, as proposed by the Examiner, does not render claims 2, 11, 18 and 25 unpatentable.

Shattuck is directed to electrostatic probes 27-29 for the electrostatic monitoring of gas turbine engines 10. The probes 27-29 are configured to be inserted into and removed from

borescope access ports of the gas turbine engine. The probes 27-29 extend through a fan duct 22 to allow tips of the probes 27-29 to enter a burn can 20 of the gas turbine gas engine 10 for the monitoring thereof. In one embodiment, Shattuck discloses the use of high pressure, flexible, metallic tubing, such as an inner, stainless steel bellows tubing surrounded by woven stainless steel mesh, for use with the probes 27-29 in the instances where there is a differential fore and aft expansion between inner and outer walls 24, 25 of the fan duct 22 of the gas turbine gas engine 10.

1. The Combination of Qureshi, Nance, Heid and Shattuck is Improper

Qureshi, Nance, Heid, and Shattuck are not properly combinable under 35 U.S.C. § 103(a) to render the present invention obvious. As stated above with respect to Qureshi, Nance, and Heid, the Examiner has not pointed to an objective teaching in Qureshi, nor in either Nance or Heid, which would lead one skilled in the art to combine each of the references. Similarly, the Examiner has not pointed to an objective teaching in Shattuck which would lead one to combine Shattuck with Qureshi, Nance and Heid.

Again, the Examiner improperly states the standard for combining references. In this instance, the Examiner argues that if someone had the references before them and had general knowledge of housing structure materials within monitoring systems, then they would combine Shattuck with the primary combination and include the Shattuck features in the housing of the “modified” Qureshi system. As stated above in Section A.2., this is not an objective teaching and relies on the presumption that the references would merely “appear” before one of ordinary skill in the art. Again, there is no objective teaching that warrants bringing the references together.

Furthermore, the Examiner has relied on non-analogous art, which is not pertinent to the problem with which the invention was concerned, in his rejection of claims 2, 11, 18, and 25. Applicant, in conceiving the present invention, was presented with the problem of monitoring one or more parameters or making visual inspections of substantial portions of the interior of a sealed container having an environment hostile to the monitoring equipment, such as a chemical reactor or a semiconductor processing chamber, thereby requiring, as in claims 2, 11, 18 and 25, a flexible protective housing to protect the monitoring equipment. Qureshi is directed to an inspection system which does not teach or suggest protection of the monitoring equipment,

focusing instead on the portability and movable aspect of the system. Since the cars are empty during inspection, while fumes and the like which could overcome workers may be present, it is not at all clear that the environment would be so hostile as to require protection of the monitoring equipment. While Shattuck suggests a bellows tubing for a distal end of the housing, Shattuck discloses (1) bellows tubing accommodating only conductors, and does not disclose bellows tubing for the housing of monitoring equipment; and (2) bellows tubing which is open at one end, and therefore is also not hermetically sealed. Also, and most importantly, the probe (including the bellows tubing) disclosed by Shattuck is not disclosed or even suitable for housing a borescope, but, as clearly stated at Col. 1, lines 64-66, the probe as a whole is merely adapted for insertion into a borescope access port of an engine. For at least these reasons, the combination of Qureshi, Nance, Heid, and Shattuck is improper.

2. Even if the Combination Were Proper, Which it is Not, the Combination Fails to Teach or Suggest All Elements of the Claims

Even if the Qureshi, Nance, Heid and Shattuck combination were proper, it fails to teach or suggest all elements of claims 2, 11, 18, and 25.

Initially, it is noted that the Examiner did not reject independent claim 17 with respect to the combination of Qureshi, Nance and Heid. Because claim 18 depends from claim 17, the rejection of claim 18 with respect to the combination is not understood.

As discussed above, the combination of Qureshi, Nance and Heid does not disclose all of the elements of the claimed invention. Even if Shattuck were properly combined with these references, Shattuck is insufficient to overcome the deficiencies noted above. That is, like the combination of Qureshi, Nance and Heid, Shattuck also has no disclosure of a hermetically sealed housing having, within an interior thereof, a transmission media for transmitting an image or an output signal from the distal end of the housing to the proximal end of the housing, and securing the proximal end of the housing to the chamber wall at an access port to form a hermetic seal between the proximal end of the housing and the chamber.

3. The Combination Fails to Provide a Reasonable Expectation of Success

A person of ordinary skill in the art would not have had any reasonable expectation of success, because the proposed modification would render the Qureshi system being modified unsatisfactory for its intended purpose. By providing the stainless steel bellows structure of

Shattuck for the Qureshi inspection system, it is not at all clear the system would still be sufficient to be maneuverable through the manway and within the interior of a tank for the inspection thereof. The Qureshi system relies on the rigid, articulated segments of the inspection arm for lifting, lowering, and otherwise manipulating the camera of the system. By replacing the articulated segments and joints with a flexible stainless steel bellows, manipulation of the inspection arm within the tank for the inspection thereof would not be accomplished in the manner intended by Qureshi. Therefore, barring difficult reconstruction and redesign of the elements of Qureshi, the modification being proposed by the Examiner could render Qureshi unsatisfactory for its intended purpose. Accordingly, a person of ordinary skill would not have been motivated to make the combination proposed by the Examiner, nor would he have had a reasonable expectation that making such a combination would result in a successful monitoring system for a hostile environment.

C. The Examiner has Failed to Establish *Prima Facie* Obviousness of Claims 3, 12, 19 and 26 Under 35 U.S.C. § 103(a) Over Qureshi in View of Nance and Heid and Further in View of Chiodo

The Examiner has rejected claims 3, 12, 19 and 26 under 35 U.S.C. § 103(a) as being unpatentable over Qureshi, Nance, and Heid as applied above and further in view of Chiodo.

The Examiner admits that Qureshi, Nance, and Heid do not disclose the housing comprising a flexible polymeric tube, as in claims 3, 12, 19 and 26. The Examiner contends that the particular use of flexible polymeric tubes for a housing associated with a camera monitoring device is old and well-recognized in the art, citing Chiodo as exemplary. The Examiner asserts that it would have been obvious to one of ordinary skill in the art to provide the flexible polymeric tube structure of Chiodo for the “housing” of Qureshi, described by the Examiner as being made up of elements 31, 32, 37, 38, 41 of Figs. 2 and 8 in the Examiner’s rejection citing the primary combination (*see* Office Action, Paper No. 11, page 2). For the below-stated reasons, the combination of Qureshi, Nance, Heid and Chiodo, as proposed by the Examiner, does not render claims 3, 12, 19 and 26 unpatentable.

Chiodo is directed to a medical apparatus for photographing body cavities. The apparatus includes an upper camera 1, a lower camera 2, and a lighting device 3 arranged in a generally tubular housing. Disposed at one end of the tubular housing is an open ended metal cap 39 to which a rubber tube 54 is permanently connected. Within the rubber tube 54, there is a shutter

operating member, which is generally a resilient wire 67 surrounded by a stiffening wire coil 69. The tube 54, resilient wire 67, and stiffening wire coil 69 connect the tubular housing with an operating mechanism.

1. The Combination of Qureshi, Nance, Heid and Chiodo is Improper

Qureshi, Nance, Heid and Chiodo are not properly combinable over 35 U.S.C. § 103(a) to render the present invention obvious. The Examiner has not pointed to an objective teaching in any of these patents which supports the combination. The Qureshi patent is concerned with the inspection of a generally open railroad tank car, whereas the Chiodo patent is concerned with a closed system for medical use for inspecting the interior of a body cavity. The Qureshi device is not sealed, whereas the device of the Chiodo patent is clearly sealed. Therefore, for at least this reason, the combination of Qureshi, Nance, Heid, and Chiodo is improper. Since the art is not even in the same field of endeavor and the references have divergent purposes, the combination is clearly a piecemeal attempt to reconstruct the claims using impermissible hindsight.

Again, the Examiner improperly states the standard for combining references. In this instance, the Examiner argues that if someone had the references before them and had general knowledge of housing structure materials within monitoring systems, then they would combine Chiodo with the primary combination and include the Chiodo features in the housing of the “modified” Qureshi system. As stated above in Section A.2., this is not a proper basis for an objective teaching.

2. Even if the Combination Were Proper, Which it is Not, the Combination Fails to Teach or Suggest All Elements of the Claims

Even if the Qureshi, Nance, Heid and Chiodo combination were proper, it fails to teach or suggest all elements of claims 3, 12, 19 and 26.

Initially, it is noted that the Examiner did not reject independent claim 17 with respect to the combination of Qureshi, Nance and Heid discussed above. Because claim 19 depends from claim 17, the rejection of claim 19 with respect to this combination including Chiodo is not understood.

The Chiodo patent does make up for the deficiencies noted above with respect to the combination of Qureshi, Nance and Heid as applied to claims 1, 9, and 23 from which claims 3, 12, and 26 depend. Specifically, Chiodo also does not teach or suggest a hermetically sealed

housing having, within an interior thereof, a transmission media for transmitting an image or an output signal from the distal end of the housing to the proximal end of the housing, or securing the proximal end of the housing to the chamber wall at an access port to form a hermetic seal between the proximal end of the housing and the chamber.

3. The Combination Fails to Provide a Reasonable Expectation of Success

Even if the combination proposed by the Examiner taught or suggested all elements of the claimed invention, which it does not, a person of ordinary skill in the art would not have had any reasonable expectation of success, because the proposed modification would render the Qureshi system being modified unsatisfactory for its intended purpose and thus would suggest just the opposite of a reasonable expectation of success. As with the discussion above with respect to the stainless steel bellows as applied to the primary combination further in view of Shattuck, by providing the flexible polymeric tube of Chiodo for the Qureshi inspection system, the Qureshi inspection system could be rendered difficult to maneuver within the interior of a railroad tank car for the inspection of the interior thereof. As discussed, by replacing the rigid articulated segments and joints with a flexible polymeric tube, manipulation of the inspection arm within the tank would likely not be able to be accomplished in the manner disclosed by Qureshi. Therefore, barring difficult reconstruction and redesign of the elements of Qureshi, the modification being proposed by the Examiner would suggest to one of ordinary skill in the art that Qureshi would be unsatisfactory for its intended purpose. Accordingly, there would be no motivation to make the combination proposed by the Examiner, nor a reasonable expectation that making such a combination would result in a successful monitoring system for a hostile environment.

D. The Examiner has Failed to Establish *Prima Facie* Obviousness of Claims 6, 7, 17, 20 and 21 Under 35 U.S.C. § 103(a) Over Qureshi in View of Nance and Heid and Further in View of Howell

The Examiner has rejected claims 6, 7, 17, 20 and 21 under 35 U.S.C. § 103(a) as being unpatentable over the primary combination as applied above and further in view of Howell.

The Examiner admits that the primary combination does not particularly disclose the housing including a borescope having a viewing end which is aligned with the sealed window, the interior of the housing including a flexible borescope for transmitting images of the interior

of the chamber obtained through the window from the distal end of the housing to the proximal end of the housing and through the port, and a monitor located outside of the chamber and connected to the borescope for receiving and displaying images of the interior of the chamber and wherein the transmission media is comprised of a fiber optic bundle, as claimed in claims 6, 7 and 17. The Examiner contends that Howell discloses a borescope guide tube and teaches the conventional use of a fiber optic bundle borescope having a viewing end which is aligned with a sealed window, as well as the other above-listed admitted deficiencies of the primary combination. The Examiner concludes that it would have been obvious to one of ordinary skill in the art to provide the fiber optic bundle borescope for transmitting and monitoring of images, as taught by Howell, as part of the chamber monitoring within Qureshi.

For the below-stated reasons, the combination of Qureshi, Nance, Heid and Howell, as proposed by the Examiner, does not render claims 6, 7, 17, 20 and 21 unpatentable.

Howell discloses a borescope guide tube 70 for use with a borescope 62. The guide tube 70 is formed of a semi-rigid plastic material. The tube 70 has an inlet 72 and an outlet 74, each formed of a sufficient size to accept the borescope 62 therein. It is contemplated that the borescope 62 used with the guide tube 70 be of the flexible fiber optic borescope variety. It is intended that the borescope 62 and guide tube 70 be used to inspect the interiors of gas turbine engines.

1. The Combination of Qureshi, Nance, Heid and Howell is Improper

Qureshi, Nance, Heid and Howell are not properly combinable under 35 U.S.C. § 103(a) to render the present invention obvious. As stated above with respect to Qureshi, Nance and Heid, and as now stated with respect to Howell, the Examiner has not pointed to an objective teaching in Qureshi, nor in either Nance or Heid, which would lead one skilled in art to combine Qureshi, Nance, and Heid with Howell. Similarly, the Examiner has not pointed to an objective teaching in Howell which would lead one to combine Howell with Qureshi, Nance, and Heid. Therefore, for at least this reason, the combination of Qureshi, Nance, Heid and Howell is improper.

The Examiner relies on the same improper standard for combining references with respect to this combination. As stated above in Section A.2., however, this is not the basis for an objective teaching.

2. Even if the Combination Were Proper, Which it is Not, the Combination Fails to Teach or Suggest All Elements of the Claims

As discussed above, the primary combination does not teach or suggest either a hermetically sealed housing having, within an interior thereof, a transmission media for transmitting an image from the distal end of the housing to the proximal end of the housing, or a housing rigidly secured to the chamber wall at an access port to form a hermetic seal between the proximal end of the housing and the chamber, as recited in claim 1. Claim 6 and 7 depend from claim 1. Accordingly, it is respectfully submitted that claim 6 and 7 distinguish patentably over the primary combination by virtue of their dependency and for the reasons discussed above with respect to independent claim 1. The Howell patent does not add anything that overcomes the deficiencies of the primary combination with respect to independent claim 1. Accordingly, the present combination including Howell fails to teach or suggest all elements of claims 6 and 7.

Independent claim 17 recites, *inter alia*, a hermetically sealed housing including a flexible borescope for transmitting images obtained through the window at the distal end of the housing, the sealed housing being rigidly secured to the wall of a chamber to form a hermetic seal with the chamber. As discussed above, the primary combination does not teach or suggest a hermetically sealed housing, secured to the wall of a container to form a hermetic seal nor does it teach rigidly securing the housing to the wall. While Howell discloses a guide tube for directing a borescope, Howell does not teach or suggest a hermetically sealed housing, rigidly secured to the wall of a chamber to form a hermetic seal with a chamber. Therefore, for at least these reasons, the combination does not teach or suggest all of the elements of independent claim 17.

Claims 20 and 21 depend from amended claim 17. Accordingly, it is respectfully submitted that claims 20 and 21 distinguish patentably over the combination by virtue of their dependency from and for the reasons discussed above with respect to independent claim 17. Accordingly, based at least on the dependency of claims 20 and 21 to independent claim 17, the combination fails to teach or suggest all of the elements of claims 20 and 21.

Therefore, for the above stated reasons, the combination fails to teach or suggest all of the elements of claims 6, 7, 17, 20, and 21.

3. The Combination Fails to Provide a Reasonable Expectation of Success

Even if the combination proposed by the Examiner taught or suggested all elements of the invention, which it does not, a person of ordinary skill in the art would not have had any reasonable expectation of success. Instead, one of ordinary skill in the art would have had the reasonable expectation that inserting a borescope through the separate articulated segments of the inspection arm of Qureshi to provide a viewing end aligned with the sealed window would be unsuccessful.

One of ordinary skill in the art would expect that, by routing a borescope through the joints and articulated segments of the Qureshi inspection arm, the maneuverability of the inspection arm would be unnecessarily decreased if not eliminated, especially considering that there is no reason to use a borescope, which is typically used for capturing images of smaller, confined spaces, with the Qureshi system. It is not difficult to access the inside of a railroad tank car, for which the Qureshi inspection system is designed to inspect. The inside of a railroad tank car is sufficiently large to allow access of a larger camera. In fact, the inside of a railroad tank car is sufficiently large to allow a worker to climb inside and personally visually inspect the interior thereof, as is conventionally done according to Qureshi. (Col. 1, lines 28-30). For the reasons stated above, there is no reasonable expectation of success of combining the borescope of Howell with Qureshi, Nance and Heid. Therefore, the claims are not rendered obvious.

Accordingly, a person of ordinary skill in the art would not have had a reasonable expectation that making such a combination would result in a monitoring system for a hostile environment.

E. The Examiner has Failed to Establish *Prima Facie* Obviousness of Claims 8, 15, 16, 22, 24 and 29 Under 35 U.S.C. § 103(a) Over Qureshi in View of Nance and Heid and Further in View of Braithwaite

The Examiner contends that the primary combination discloses substantially the same optical monitoring system as claimed, but admits that it does not particularly disclose (a) an interior of the housing which is provided with a fluid under pressure to control the environment within the interior of the housing, as claimed in claims 8, 16, 22, and 29; (b) a camera which is an infrared camera, as claimed in claim 15; and (c) a sensor which is selected from the group consisting of a temperature sensor, a pressure sensor, and oxygen sensor, and a spectragraphic chemical analysis sensor, as claimed in claim 24. The Examiner contends that Braithwaite

discloses an apparatus and method for measuring extensional rheological properties of a material and teaches the conventional fluid pressure control of an environment within the interior of a housing, temperature sensors, and the use of infrared cameras for monitoring elements within the housing. The Examiner concludes that it would have been obvious to one of ordinary skill in the art to provide the infrared camera, temperature sensor, and fluid pressure control system of Braithwaite for the interior of the housing of Qureshi.

For the below-stated reasons, the combination of Qureshi, Nance, Heid, and Braithwaite, as proposed by the Examiner, does not render claims 8, 15, 16, 22, 24, and 29 unpatentable.

Braithwaite is directed to an apparatus and method for measuring extensional rheological (fluid flow) properties of a material. The apparatus 10 includes opposed surfaces 110, 112, which define a sample site 120. The opposed surface 110 moves axially along an axis 160 using a plunger system 170. The apparatus 10 further includes a light source 140, which provides a light beam 144. The light beam 144 passes through the sample site 120 and is recorded by a light detector 150, which is in communication with a data collector such as a personal computer 180. The sample site 120 is held within a housing 130, which permits the controlling of ambient conditions. The ambient conditions of the housing 130 can be controlled by a heating system 134, such as an oven and a temperature controller 136, to provide control over the temperature of the sample site 120 and the environment surrounding the sample site 120. Alternatively, a cooler 138 may be used for sub-ambient temperature control. Relative humidity and partial pressure of gases may also be controlled within the housing 130 by circulating conditioned gas into and out of the housing 130.

1. The Combination of Qureshi, Nance, Heid, and Braithwaite is Improper

Again, the Examiner improperly states the standard for combining references. In this instance, the Examiner argues that if someone had the references before them and had general knowledge of hostile environment monitoring, then they would combine Braithwaite with the other references and include the Braithwaite features in the housing of the “modified” Qureshi system. As stated above in Section A.2., this is not a basis for an objective teaching. Further, monitoring rheological properties of fluid flow would not be useful for monitoring empty tank cars as in Qureshi.

Qureshi, Nance, Heid, and Braithwaite are not properly combinable over 35 U.S.C. § 103(a) to render the present invention obvious. The Examiner has failed to point to a specific objective teaching in any of the references which would support their combination. Further, it is submitted that the Qureshi reference and the Braithwaite reference, themselves, teach away from such a combination because the Qureshi patent teaches a generally open system, whereas the Braithwaite publication teaches a sealed or enclosed system. For at least these reasons, the combination of Qureshi, Nance, Heid, and Braithwaite is improper.

2. Even if the Combination Were Proper, Which it is Not, the Combination Fails to Teach or Suggest All Elements of the Claims

Even if the Qureshi, Nance, Heid and Braithwaite combination were proper, it fails to teach or suggest all elements of claims 8, 15, 16, 22, 24, and 29.

Initially, it is noted that the Examiner did not reject independent claim 17 with respect to the primary combination discussed above. Because claim 22 depends from claim 17, the rejection of claim 22 with respect to the present combination is not understood.

As discussed above, the primary combination does not disclose all of the elements of the claimed invention. Even if Braithwaite were combined with the primary combination, Braithwaite is insufficient to overcome the deficiencies noted above, specifically a hermetically sealed housing having, within an interior thereof, a transmission media for transmitting an image or an output signal from the distal end of the housing to the proximal end of the housing, and securing the proximal end of the housing to the chamber wall at an access port to form a hermetic seal between the proximal end of the housing and the chamber. Moreover, with respect to claims 8, 16, 22 and 29, Braithwaite does not teach or suggest the controlling of an environment within an interior of a housing within which sensors and/or cameras are located for the monitoring of an environment outside of the housing. Instead, Braithwaite discloses an apparatus for measuring properties inside a sample site, which controls the environment of the sample site, maintaining it at a desired pressure and temperature. The monitoring equipment used to monitor the sample site (the light source and light detector) is located outside of the sample site and is not within the controlled environment. Additionally, with respect to claim 24, Braithwaite does not disclose a spectrographic chemical analysis sensor. Therefore, for at least these reasons, the combination fails to teach or suggest all elements of claims 8, 15, 16, 22, 24 and 29.

3. The Combination Fails to Provide a Reasonable Expectation of Success

Even if the combination proposed by the Examiner taught or suggested all elements of the invention, which it does not, a person of ordinary skill in the art would not have had any reasonable expectation of success. One of ordinary skill in the art would not have considered the combination, because in so carrying out the combination, one would not have had a reasonable expectation of being able to control the environment within each of the separate articulated segments of the inspection arm of Qureshi using fluid under pressure, particularly since the interior of the open manway of Qureshi does not involve a flowing fluid requiring rheological measurement.

The combination does not render the claims obvious because there is no suggestion of the desirability in combining the references as proposed by the Examiner. There is no need to control the environment within the segments of the Qureshi inspection arm and no fluid flowing therein requiring rheological measurement. Therefore, the resultant combination is not rendered obvious.

Accordingly, a person of ordinary skill would not have been motivated to make the combination proposed by the Examiner, nor would he have had a reasonable expectation that making such a combination would result in a successful monitoring system for a hostile environment.

F. Even if the Examiner had Shown *Prima Facie* Obviousness, the Invention as Claimed Demonstrates Secondary Considerations Which Overcome Any Such *Prima Facie* Obviousness

Even if the Examiner had shown *prima facie* obviousness based on any of the above combinations, which he did not, the invention as claimed would not be rendered obvious under 37 U.S.C. § 103(a). Prior to Applicant's invention, there was a long-felt need in the art for a device capable of viewing and/or monitoring the conditions within hostile environments, such as the environments present within semiconductor wafer processing chambers. The production of semiconductor wafers requires careful monitoring so as to reduce the likelihood of producing defective or otherwise substandard wafers. Because of the size of the wafers currently being produced and the number of individual chips that can be produced per wafer, the production of just one defective wafer could result in a monetary loss in the hundreds of thousands of dollars.

Therefore, should a problem arise during wafer production, it is imperative that the problem is quickly diagnosed and corrected in order to prevent the production of a defective wafer.

Prior to the claimed invention, such problems could only be diagnosed after the production of a defective wafer, or by visually inspecting the operation of a semiconductor wafer processing chamber through a window within the wall of the chamber. As stated above, discovery of the problem after a defective wafer is produced creates large monetary losses. Monitoring of the process through a window within the chamber is also an imperfect solution because one may not always be able to visually diagnose a problem within the chamber. For example, it is difficult, if not impossible, to realize changes in pressure or temperature within the chamber, which could result in the production of a defective wafer, by merely viewing the inside of the chamber through a window. Moreover, such windows introduce the possibility of leaking, thereby allowing the escape of potentially harmful chemicals from the chamber and/or the entry into the chamber of contaminants, which are harmful to wafer production.

For this reason, there was a long-felt need in the art to have a monitoring system within the chamber in order to monitor one or more parameters, such as temperature and pressure, within the semiconductor wafer processing chamber. (Spec. page 1, lines 16-18). However, the use of existing, standard, unprotected monitoring equipment within such a chamber is ineffective because most existing monitoring equipment is simply not constructed to withstand the severe pressures, temperatures, and harmful chemicals present within the chamber. (Spec. page 1, lines 20-25). The monitoring system of the present invention overcomes this problem and fills the long-felt need by providing protection for the sensitive measuring and/or monitoring equipment to enable such equipment to be placed within the hostile environment of the chamber. (Spec. page 1, lines 25-29). In this way, the monitoring system of the present invention can be used for calibration, inspection, and maintenance within the chamber during operation of the chamber, thereby allowing for relatively quick diagnosis and correction of problems without the necessity of having to shut down operation of the chamber and open it up (Spec. page 2, lines 1-2). Moreover, because the chamber need not be opened up, the likelihood of contamination entering the chamber is reduced.

Therefore, if the Examiner had shown *prima facie* obviousness, it is overcome because there was a long-felt need in the art for a device such as the invention claimed.

VIII. CONCLUSION

For the reasons set forth above, appellant respectfully submits that he has sufficiently shown that pending claims 1-31 are patentable over the prior art cited by the Examiner. Reversal of the rejections and issue of a notice of allowance are respectfully requested at the earliest opportunity.

Respectfully submitted,

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LLC/MPH

Enclosure: Petition for Extension of Time (two-month)
Attachment: Appendix A – Pending Appealed Claims

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APPENDIX A
CLAIMS IN PRESENT FORM
U.S. PATENT APPLICATION SERIAL NO.: 10/058,658

1. (Previously presented) An optical monitoring system for transmitting images from a hostile environment within the interior of a sealed chamber to the chamber exterior, the chamber having a wall and an access port extending through the wall, the monitoring system comprising:

a flexible, generally tubular, elongated, hermetically sealed housing having a distal end, a proximal end and an interior, the housing being made of a non-porous, corrosive resistant material, the distal end of the housing including a sealed window, the proximal end of the housing being rigidly secured to the chamber wall at the access port to form a hermetic seal between the proximal end of the housing and the chamber, the interior of the housing being accessible through the access port, the interior of the housing including a transmission media for transmitting images of the interior of the chamber obtained through the window from the distal end of the housing to the proximal end of the housing and through the access port; and

a monitor located outside of the chamber and connected to the transmission media for receiving and displaying the images of the interior of the chamber.

2. (Original) The optical monitoring system as recited in claim 1, wherein the housing comprises a flexible sheath formed of a stainless steel bellows.

3. (Original) The optical monitoring system as recited in claim 1, wherein the housing comprises a flexible polymeric tube.

4. (Original) The optical monitoring system as recited in claim 1, wherein the window is formed from a material selected from the group consisting of synthetic sapphire, glass, quartz and a polymeric material.

5. (Original) The optical monitoring system as recited in claim 4, wherein the window is secured to the housing by a method selected from the group consisting of brazing, fusion and an adhesive.

6. (Original) The optical monitoring system as recited in claim 1, wherein the housing includes a borescope having a viewing end which is aligned with the sealed window.

7. (Original) The optical monitoring system as recited in claim 1, wherein the transmission media is comprised of a coherent fiber optic bundle.

8. (Original) The optical monitoring system as recited in claim 1, wherein the interior of the housing is provided with a fluid under pressure to control the environment within the interior of the housing.

9. (Previously presented) An optical monitoring system for transmitting images from a hostile environment within the interior of a sealed chamber to the chamber exterior, the chamber having a wall and an access port extending through the wall, the monitoring system comprising:

a flexible, generally tubular, elongated, hermetically sealed housing having a distal end, a proximal end and an interior, the housing being made of a non-porous, corrosive resistant material, the distal end of the housing including a sealed window and a camera positioned to record images of the interior of the chamber through the window, the proximal end of the housing being rigidly secured to the chamber wall at the access port to form a hermetic seal between the proximal end of the housing and the chamber, the interior of the housing being accessible through the access port, the interior of the housing including a transmission media for transmitting the images of the interior of the chamber recorded by the camera from the distal end of the housing to the proximal end of the housing and through the access port; and

a monitor located outside of the chamber and connected to the transmission media for receiving and displaying the recorded images of the interior of the chamber.

10. (Original) The optical monitoring system as recited in claim 9, wherein the camera is a video camera.

11. (Original) The optical monitoring system as recited in claim 9, wherein the housing comprises a flexible sheath formed of a stainless steel bellows.

12. (Original) The optical monitoring system as recited in claim 9, wherein the housing comprises a flexible polymeric tube.

13. (Original) The optical monitoring system as recited in claim 9, wherein the window is formed from a material selected from the group consisting of synthetic sapphire, glass, quartz and a polymeric material.

14. (Original) The optical monitoring system as recited in claim 9, wherein the window is secured to the housing by a method selected from the group consisting of brazing, fusion and an adhesive.

15. (Previously presented) The optical monitoring system as recited in claim 9, wherein the camera is an infrared camera.

16. (Original) The optical monitoring system as recited in claim 9, wherein the interior of the housing is provided with a fluid under pressure to control the environment within the interior of the housing.

17. (Previously presented) An optical monitoring system for transmitting images from a hostile environment within the interior of a sealed chamber to the chamber exterior, the chamber having a wall and an access port extending through the wall, the monitoring system comprising:

a flexible, generally tubular, elongated, hermetically sealed housing having a distal end, a proximal end and an interior, the housing being made of a non-porous, corrosive resistant material, the distal end of the housing including a sealed window, the proximal end of the housing being rigidly secured to the chamber wall at the access port to form a hermetic seal between the proximal end of the housing and the chamber, the interior of the housing being accessible through the access port, the interior of the housing including a flexible borescope for transmitting images of the interior of the chamber obtained through the window from the distal end of the housing to the proximal end of the housing and through the access port; and

a monitor located outside of the chamber and connected to the borescope for receiving and displaying the images of the interior of the chamber.

18. (Original) The optical monitoring system as recited in claim 17, wherein the housing comprises a flexible sheath formed of a stainless steel bellows.

19. (Original) The optical monitoring system as recited in claim 17, wherein the housing comprises a flexible polymeric tube.

20. (Original) The optical monitoring system as recited in claim 17, wherein the window is formed from a material selected from the group consisting of synthetic sapphire, glass, quartz and a polymeric material.

21. (Original) The optical monitoring system as recited in claim 17, wherein the window is secured to the housing by a method selected from the group consisting of brazing, fusion and an adhesive.

22. (Original) The optical monitoring system as recited in claim 17, wherein the interior of the housing is provided with a fluid under pressure to control the environment within the interior of the housing.

23. (Previously presented) A monitoring system for monitoring a parameter of a hostile environment within the interior of a sealed chamber, the chamber having a wall and an access port extending through the wall to the chamber exterior, the monitoring system comprising:

a flexible, generally tubular, elongated, hermetically sealed housing having a distal end, a proximal end and an interior, the housing being made of a non-porous, corrosive resistant material, the distal end of the housing including a sealed window and a sensor for sensing a parameter of the hostile environment through the window, the proximal end of the housing being rigidly secured to the chamber wall at the access port to form a hermetic seal between the proximal end of the housing and the chamber, the interior of the housing being accessible through the access port, the interior of the housing including a transmission media for transmitting an output signal of the sensor from the distal end of the housing to the proximal end of the housing and through the access port; and

an apparatus located outside of the chamber and connected to the transmission media for receiving and processing the sensor signal and displaying a representation of the sensor signal.

24. (Previously presented) The monitoring system as recited in claim 23, wherein the sensor is selected from the group consisting of a temperature sensor, a pressure sensor, an oxygen sensor and a spectra graphic chemical analysis sensor.

25. (Previously presented) The monitoring system as recited in claim 23, wherein the housing comprises a flexible sheath formed of a stainless steel bellows.

26. (Previously presented) The monitoring system as recited in claim 23, wherein the housing comprises a flexible polymeric tube.

27. (Previously presented) The monitoring system as recited in claim 23, wherein the window is formed from a material selected from the group consisting of synthetic sapphire, glass, quartz and a polymeric material.

28. (Previously presented) The monitoring system as recited in claim 23, wherein the housing further includes a sealed window secured to the distal end of the housing by a method selected from the group consisting of brazing, fusion and an adhesive.

29. (Previously presented) The monitoring system as recited in claim 23, wherein the interior of the housing is provided with a fluid under pressure to control the environment within the interior of the housing.

30. (Previously presented) An optical monitoring system for transmitting images from within the interior of a sealed chamber to the chamber exterior, the chamber having a wall and an access port extending through the wall, the monitoring system comprising:

a generally tubular, elongated, hermetically sealed housing having a distal end, a proximal end and an interior, the housing being made of a non-porous material, the distal end of the housing including a sealed window, the proximal end of the housing being secured to the chamber wall at the access port to form a hermetic seal between the proximal end of the housing and the chamber, the interior of the housing being accessible through the access port, the interior of the housing including a transmission media for transmitting images of the interior of the chamber obtained through the window from the distal end of the housing to the proximal end of the housing and through the access port; and

a monitor located outside of the chamber and connected to the transmission media for receiving the images of the interior of the chamber.

31. (Previously presented) A monitoring system for monitoring a parameter within the interior of a sealed chamber, the chamber having a wall and an access port extending through the wall to the chamber exterior, the monitoring system comprising:

a generally tubular, elongated hermetically sealed housing having a distal end, a proximal end and an interior, the housing being made of a non-porous material, the distal end of the housing including a sealed window and a sensor for sensing a parameter of the hostile environment through the window, the proximal end of the housing being rigidly secured to the chamber wall at the access port to form a hermetic seal between the proximal end of the housing and the chamber, the interior of the housing being accessible through the access port, the interior of the housing including a transmission media for transmitting an output signal of the sensor from the distal end of the housing to the proximal end of the housing and through the access port; and

an apparatus located outside of the chamber and connected to the transmission media for receiving and processing the sensor signal.